

# Ch1: Introduction

## Database

### a) generic definition:-

→ Collection of data, used to represent information of interest to an information system.

### b) more technical definition:-

→ Collection of data, managed by DBMS.

### \* DBMS (data base management sys.)

→ able to manage collections of data that are large, shared and ~~are~~ persistent.

→ ensure their ~~reliability~~ reliability and Privacy.

### \* reliability of data

← إذا حدث (Failure) في الـ (data) الـ (system) سيجب

← من أحد الوسائل التي تجعل الـ (data) reliable نقوم بعمل (backup).

### \* Privacy of data

← يوجد (Concerency Control) يقوم بعمل (oscillization)

للـ (data) ويمنع بذلك حماية البيانات.

\* DBMS must be efficient & effective.

(efficient) ← علاقة بين الخرج والدخل .

(effective) ← علاقة بال (Product) .

← يعني نفع بال (output) فقط .

~~collections of data are~~

\* Collections of data are :-

a) large :-

- ~~data~~ much bigger than main memory available.
- DBMS must manage data in secondary memory.

b) shared :

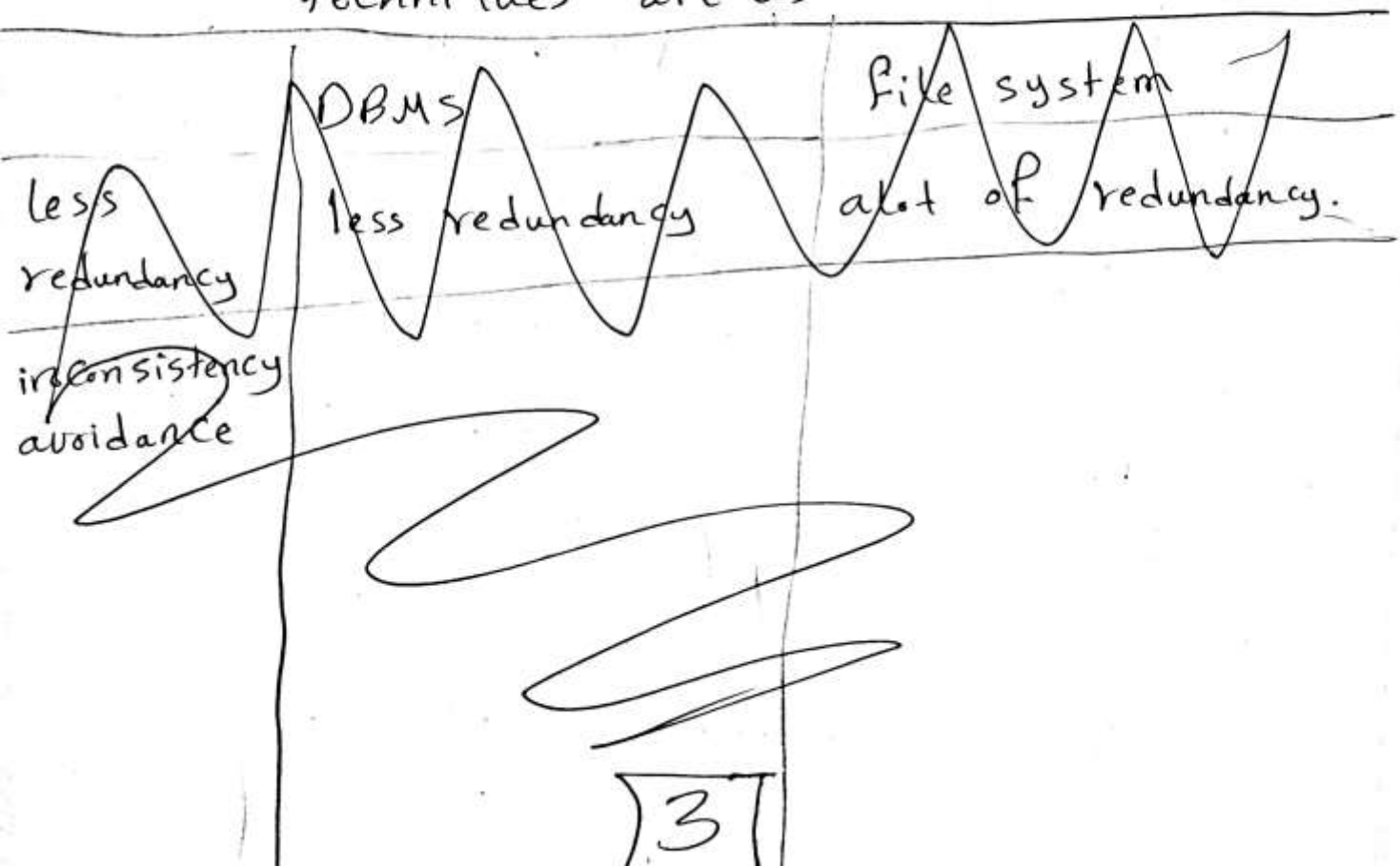
- used by various applications and users.
- so redundancy of data is reduced.
- repetitions are avoided and possibility of inconsistencies is reduced.
- DBMS makes use of special mechanism called concurrency control.

c) Persistent :-

- with a lifespan that is not limited to single executions of the programs that use them.

## sharing

- data of interest of various components often overlap.
- database is integrated resource, shared by various components.
- Integration & sharing allow a reduction of redundancy and consequent possibility of inconsistency.
- Since sharing is never complete, DBMS provide support for privacy of data & access authorizations.
- sharing requires that multiple accesses of data are suitably organized: Concurrency Control techniques are used.



	DBMS	File system
less redundancy	less	a lot of redundancy
Efficiency	more efficient	less efficiency <sup>+</sup>
Data integrity	easier to maintain data integrity.	Provide rough support for sharing

### Notes

- if the same piece of information is stored in more than one place, then any changes in the data need to occur in all places that data is stored.
- DBMS is more efficient ~~more~~ than file-system, because a piece of information is stored in fewer locations.
- There is no sharp line between DBMS & non-DBMS: DBMSs provide many features, that extend those of file systems.
- (Dictionary or Catalogue) → describe database which is shared (on DBMS).

## Data Models

- Relational model (the most wide spread)
- Hierarchical model (ex: tree)
- Network model (ex: Graph)
- Object model (ex: objects)

### \* Physical model →

→ شكل ال (storage data) في ال (memory)

### \* Logical model

→ organization of data from theoretical way.

ex: Relational, network, hierarchical, object

→ ال (data) مخزنة في ال (memory) على هيئة بنى واعدة.

### \* Conceptual models

→ معنى ال (logical model)

→ معنى بمستوى أعلى ولا هو (relations between data) أو ال (concepts of real world)

→ They are used in the early stages of database design.

→ There an example for relational model but I neglect it because that in second file-pdf we mention more than one example.

\* The schema in the database: is a part that invariant in time (stable over time).

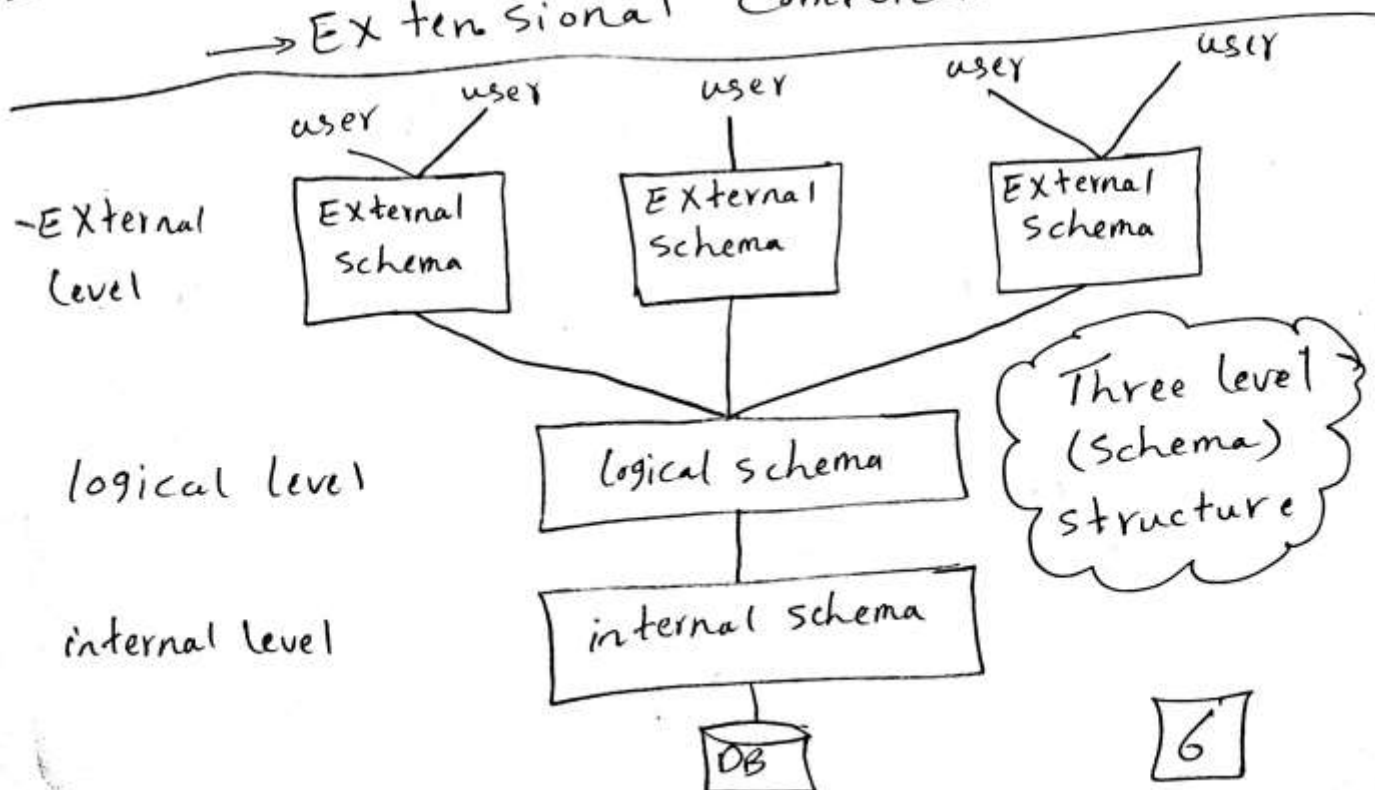
Attributes: made up of the characteristics of data.  
→ intensional component.

\* The instance of database:

→ Part that can change with time.

Rows: made up of the actual data.

→ Extensional Component.



### \* Logical Schema

→ description of a whole database by means of logical model used by the DBMS (relational, hierarchical, network, object)

### \* Internal Schema:-

→ describe the implementation of logical schema by means of physical storage structure:

- a) sequential file.      b) Hash file.
- c) sequential files with indices.

### \* External Schema:-

→ description of portion of database by means of logical model:

→ offer a different organization of the data to reflect point of view of particular user or group of users - views.

→ ~~the~~ similar to logical model.



## Data Independence

### \* Physical independence

- logical & external level are independent of the physical level.
- relation is not influenced by its physical implementation.

### \* Logical independence:-

- external level is independent of logical one.
- addition of views do not require changes to logical schema.
- changes of logical schema need not affect external schema.

### \* Data Definition Language (DDL)

- used to define logical, external and physical schemas and access authorizations.

### \* Data manipulation language (DML)

- used for querying and updating database instances.



## users & Designers

### 1) Database Administrator (DBA)

→ person responsible for design, control and administrator of database.

### 2) Application designers and Programmers

→ uses DML.

→ Define & create programs that access database.

### 3) users :-

→ End user: Predifined activities (transactions)

→ Casual user: specialists in language - able to use interactive languages to gain access to data base.

### ⇒ Advantages of DBMS

→ Common resource.

→ standard & precise model.

→ Centralized Control on data.

→ Data independence.

→ Sharing: reduction of redundancy and inconsistency.

## \* Disadvantages of DBMS

- a) Expensive products, complex, and quite different from any other software tools.
- b) a whole set of services which necessarily carry a cost can generate inefficiency.

[10]